

## ORIGINAL ARTICLE

# Face and Content Validity of a Handwriting Program for Children With Handwriting Difficulties

Mahfuzah Zainol<sup>1,2</sup>, Masne Kadar<sup>1</sup>, Nor Afifi Razaob<sup>1</sup>, Farahiyah Wan Yunus<sup>1</sup>

<sup>1</sup> Centre for Rehabilitation and Special Needs Studies, Occupational Therapy Programme, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia.

<sup>2</sup> Special Education Rehabilitation Unit, Special Education Support Service Sector, Special Education Division, Ministry of Education, Malaysia, Aras 2, Blok E2, Kompleks E, 62604 Putrajaya, Malaysia.

## ABSTRACT

**Introduction:** Occupational therapists have been developing various handwriting intervention that has fundamental occupational goals with known validity to guide professional practice in the treatment of children with handwriting difficulties. This study aimed to explore the development and content validation of a developed handwriting intervention programme for children with handwriting difficulties. **Methods:** This study employed a combination of qualitative and quantitative methodology based on the sequential exploratory design in two main stages. The first stage is the focus group discussion and followed by a validation procedure using face and content validity scored by the expert reviewers. A total of thirteen experts participated in this study. **Results:** The findings were analyzed thematically according to physical appearance, language used, and content in the developed programme. The face and content validity report a convincing value, ranging from 0.99 to 1.00 of S-CVI values on four aspects, relevancy, clarity, simplicity, and ambiguity in the developed programme. **Conclusion:** This study provided preliminary approval for the development and validation of a handwriting intervention programme for children with handwriting difficulties to support the demand in the Malaysian school curriculum.

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## Corresponding Author:

Mahfuzah Zainol, PhD

Email: mahfuzah98@gmail.com

Tel: +60134740211

## INTRODUCTION

Handwriting difficulty affected about 6-33% of children, specifically in motor coordination and visual-motor aspects (1,2). Handwriting difficulty was defined as dyslexic dysgraphia (3). Meanwhile, literature defined handwriting difficulty when a child scored at or below the 3rd percentile in the Systematic Screening of Handwriting Difficulties (4). Hence, the definition of handwriting difficulty is a consequence of interference in letter recognition (visual skills) and letter formation (motor skills) in handwriting.

Handwriting difficulty among children occurred due to a lack of motor skills, visual-motor deficiency, poor parental support, and reduced self-motivation (2). Motor skills inadequacy includes poor posture and awkward pencil grasp. Insufficient visual-motor skills resulted in reversal writing letters, lack of ability to copy a word from a visual board onto paper, missing letters during copying activity, and the absence of space between

written words (5,6). In addressing these, literature supported that occupational therapy interventions such as biomechanical, neuromotor, cognitive, sensory integrative, compensatory and positive collaboration consultation approaches are effective to treat handwriting difficulty among children (4,7-11). Many handwriting intervention foundation frameworks can be integrated to guide professional practice within a specific setting. Therefore, developing and validating a handwriting intervention programme with occupational therapy theoretical knowledge would be meaningful for children to optimize their school participation.

Handwriting intervention programmes might differ in each country, based on the specific socio-cultural, economic, and educational background. A current study considered that handwriting intervention should be integrated into the school curriculum (12). Consequently, a handwriting intervention programme should be planned uniquely to suit a particular educational system. It is also valuable to develop a handwriting programme with a combination of fundamental frameworks, direct task-based learning, and collaborative partnerships with additional commercial value to sustain its application in the future (13). Then, any developed intervention programme should be validated to certify its application

in practice among the targeted group (14). A handwriting intervention must have a fundamental direction to guide professional practitioners who work with children, such as teachers and occupational therapists.

Considering that occupational therapy handwriting intervention practice in Malaysia has not been standardized, this study focused on the development and content validity of a newly developed handwriting intervention programme for children with handwriting difficulties to participate in the school curriculum. Therefore, the research objectives for this study were to explore consensus opinions among experts about the developed handwriting intervention programme and to measure the content validity index scores for the revised handwriting intervention programme to inform future practice.

## **MATERIALS AND METHODS**

### **Ethical Approval**

Ethics approval was granted by The Medical Research and Innovation Secretariat, Universiti Kebangsaan Malaysia, UKM PPI/111/8/JEP-2020-491. Permission to conduct the study was also granted by the Educational Planning and Research Development (EPRD), Ministry of Education, KPM.600-3/2/3-eras(8087). The consent was gained from the experts before the study was conducted. All data gathered for this study was treated to protect the confidentiality and anonymity of the participants.

### **Study Design**

This study was executed based on mixed methodology specifically the sequential exploratory design. This design started with qualitative data collection followed by a quantitative research method. The qualitative method was used to explore the description of the developed handwriting intervention programme for rehabilitation purposes, while the quantitative method measured the magnitude of the effect of the programme application in the field of study (15). The study has two stages involving (1) a focus group discussion (FGD), and (2) a Content Validity Index (CVI) for the validation of the developed intervention programme. Both stages in this study are comprehensively explained in this article. The CVI stage study design was adapted from Polit, Beck, and Owen (2007), in which researchers executed one round of content validation procedure after the amendment made following the FGD session.

### **Recruitment of experts**

The same experts were involved in both stages of this study. Purposive and convenient sampling is applied to provide rich and relevant data collection among the expert's characteristics (16). The experts invited in this study were occupational therapists and clinical psychologists from various settings who have been working with children. The occupational therapy experts were selected based on their work, contribution,

and experience in delivering handwriting intervention to children. Meanwhile, researchers included clinical psychology experts because they have clinical application skills in assessment and intervention that might provide valuable input for this study.

Previous studies recommended a sufficient number of experts for a content validity study to be between two and twenty (17). A recent study suggested that the number of participants in the FGD should be between ten and twelve (18).

The criteria to become an expert for this study were as follows: (1) has a qualification in Occupational Therapy, (2) a minimum of five-year experience in an occupational therapy area, (3) working full time as an occupational therapist, and (4) work in Malaysia for at least three years. The exclusion criteria for occupational therapy experts were: (1) does not have experience working with children and (2) qualification in Occupational Therapy is below Bachelor degree.

The inclusion criteria for clinical psychology experts were as follows: (1) has a qualification in Clinical Psychology, (2) a minimum of five-year experience in a clinical psychology area, (3) work full time as a clinical psychologist, and (4) work in Malaysia for at least three years. The exclusion criteria for clinical psychology experts are: (1) does not have experience working with children and (2) qualification in Clinical Psychology is below Master's degree. All experts had the option to join this study and withdraw at any time.

### **Stage 1: Focus Group Discussion (FGD)**

#### ***Data Collection***

In the first stage, the research utilized a focus group discussion (FGD) among the experts. The FGD was held online via a Zoom meeting session due to the Covid-19 pandemic where all physical meetings were prohibited. Each expert was given a letter of invitation, a consent form, a research information sheet, and the softcopy draft of the developed programme to review one week before the actual FGD session. This was to ensure sufficient time for the experts to read and comment on the programme beforehand. The FGD session was recorded (audio-visual) after permission was obtained before the session. The FGD session lasted for approximately three hours. The first author moderated the FGD session using a Microsoft PowerPoint presentation as guidance.

#### ***Data Analysis***

Thematic analysis was applied by using a deductive qualitative approach. Data analysis was completed using a software analysis programme namely nVivo version 12. The FGD audio recordings were transcribed verbatim. Member checking was done with the experts to clarify the summary of the given information. The transcripts were sent back to each expert to review their information and alter any data not deemed as correct

(19). Later, pseudonyms replaced experts' names to strengthen confidentiality. Subsequently, the codes were categorised and grouped into identified themes. The codes, categories, and themes generated from the transcripts were determined. The audit trail was completed by the 2nd, 3rd, and 4th authors in confirming the credibility of thematic analysis procedures(20). The themes were demonstrated and discussed.

## Stage 2: Content Validity Index (CVI)

### Data Collection

Content validity is the degree of quantifying agreement among experts (21). The content validation procedure was conducted through an online method in which the revised version of the programme and the Content Validity Index (CVI) form was sent via email (22). The CVI form was a psychometric instrument (containing quantitative and qualitative methods) to measure a developed programme's face and content validity. The face validity explored three aspects; physical appearance, language used, and content applied in the handwriting intervention programme. Face validity is the measurement of the physical appearance of a product (21). Meanwhile, the content validity evaluated four dimensions, relevancy, clarity, simplicity, and ambiguity for all programme sections. A flowchart of the development and validation process is presented in Figure 1.

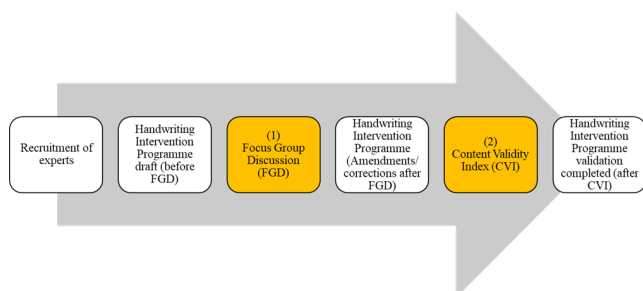


Figure 1: Flowchart of the content validation process.

### Data Analysis

Corresponding to the FGD session, researchers made amendments to the handwriting intervention programmes to polish them, keeping with the relevant experts' comments. After the amendments were completed, CVI forms were sent to all experts for scoring. The experts were requested to rate each section independently (rate 1 to 4) according to the CVI scale on four dimensions; (1) relevancy, (2) clarity, (3), simplicity, and (4) ambiguity. For example, to represent the relevancy dimension, score 1 suggests information included is not relevant, score 2 means the information included is somewhat relevant, score 3 indicates information included is quite relevant, and score 4 implies the information included is highly relevant. To avoid confusion among the experts, the researchers guided all experts to complete the scoring via email and text messages. All experts were given two weeks to finalize the developed handwriting intervention programme scores.

For the calculation of CVI, the valid rating is recorded as 1 (for a rating scale of 3 or 4), and the opposite rating is 0 (for a rating scale of 1 or 2) (22). The formula used to calculate for Item-Content Validity Index (I-CVI) is the total number of expert agreements (rating 3 or 4) divided by the total number of experts (14,23). The Scale-Content Validity Index (S-CVI) is the proportion of items that achieve a relevant scale of 3 or 4 by all experts (24). Universal agreement (UA) score is given as 1 when the item achieved 100% experts in agreement; otherwise, the UA score is given as 0 (14,22,25).

## RESULTS

### Demographic characteristics of the experts

In this study, we had given invitations to fifteen intended panel experts; however, only thirteen experts signed the consent form to participate. The demographic data of the participant is simplified in Table I.

### Findings from the FGD session (Stage 1)

The findings from the FGD were analyzed thematically for (1) physical appearance, (2) language used, and (3) content. The outline content of the developed handwriting intervention programme is demonstrated in Table II. A deductive data analysis approach was carried out to answer the first research question in exploring the consensus opinion among experts about the handwriting intervention programme. Deductive approach analysis collected verbal information from the FGD session into the specified themes (26).

Table I: Demographic data of experts

Category	Percentage (N=13)
<b>Gender</b>	
Male	8% (n=1)
Female	92% (n=12)
<b>Professional area</b>	
Occupational therapy	85% (n=11)
Clinical psychology	15% (n=2)
<b>Age (years)</b>	
30-39	92% (n=12)
40-49	8% (n=1)
<b>Ethnicity</b>	
Malay	77% (n=10)
Chinese	15% (n=2)
Indian	8% (n=1)
<b>Level of education</b>	
Bachelor's degree	54% (n=7)
Master's degree	38% (n=5)
Doctorate	8% (n=1)
<b>Working experience (years)</b>	
6-10	38% (n=5)
11-20	62% (n=8)
<b>Types of profession</b>	
Clinician	54% (n=7)
Management	31% (n=4)
Education	15% (n=2)

**Table II: Outline content of the developed handwriting intervention programme**

Outline Content of Handwriting Intervention Programme
<p><b>Section A: Introduction to Handwriting Skills</b></p> <ul style="list-style-type: none"> <li>- Problems related to handwriting</li> <li>- Factors in handwriting issues</li> <li>- Suggested frequency for handwriting intervention</li> <li>- Target group</li> </ul>
<p><b>Section B: Occupational Therapy Service Procedure for Handwriting Intervention</b></p> <ul style="list-style-type: none"> <li>- Screening checklist</li> <li>- Assessment</li> <li>- Planning</li> <li>- Intervention</li> <li>- Re-evaluation</li> </ul>
<p><b>Section C: Intervention for Handwriting Readiness Skills</b></p> <ul style="list-style-type: none"> <li>- Handwriting development</li> <li>- Pre-writing skills</li> <li>- Gross motor skills activities</li> <li>- Fine motor skills activities</li> <li>- Motor visual skills activities</li> </ul>
<p><b>Section D: Intervention for Handwriting Skills</b></p> <ul style="list-style-type: none"> <li>- Handwriting tools</li> <li>- Pencil grasp</li> <li>- Posture and position</li> <li>- Hand dominance</li> <li>- Letter formation: Capitals, Lowercase, Numbers</li> <li>- Handwriting speed</li> </ul>
<p><b>Section E: Handwriting Intervention Module</b></p> <ul style="list-style-type: none"> <li>- Session 1: Development of Handwriting Skills Activities</li> <li>- Session 2: Pre-writing Skills Activities</li> <li>- Session 3: Gross and Fine Motor Skills Activities</li> <li>- Session 4: Writing Capital Letters</li> <li>- Session 5: Writing Lowercase Letters</li> <li>- Session 6: Writing Numbers</li> </ul>

### Physical appearance

#### Font

Initially, the researchers used a fancy handwriting font; however, the experts suggested a standard and professional font be used for the whole programme. One expert pointed out that there were some confusions with the fancy handwriting font:

*“I think it is quite confusing because of the font; for example, the number 1 is similar to alphabet l on some pages in the programme.” (ID7)*

This comment was supported by other experts (ID1, ID3, ID9). They recommended applying font Arial, 14pt size, and 1.5 spacing for the programme. This comment was resolved according to suggestions.

#### Graphic

The programme has been graphically designed with a fun theme that includes using designed clip art to resemble children doing handwriting intervention activities. However, the experts claimed that children’s graphic clip art should be replaced with real pictures of kids doing the intervention activities. The graphic should reflect the biomechanics element of the posture and position during the intervention activities (ID1):

*“This programme will be a very useful guide for educators*

*and clinical practitioners if you use real photos instead of clip art to exhibit body parts accurately, like sitting on the chair, positioning on the gym ball, weight-bearing activity, throwing, and catching activities. It will add more clinical values on the ergonomic aspects as well as educational values for the educators who refer this programme for handwriting activities in school.” (ID1)*

In addition to that, there was also a comment on the incorrect placing of the paper position picture in Section D:

*“The paper placing should be slanted more to the right in this paper placement picture.” (ID4)*

In Section E, experts ID6 also suggested reducing irrelevant graphics on the module page.

*“To make this programme more effective for children who are easily distracted by visuals, please reduce the insignificant additional graphic as they might distract the child’s view during the handwriting practice.” (ID6)*

These recommendations were addressed as suggested.

#### Language

This programme was developed in Malay language for Malaysian practitioners. All experts agreed that the language terms used in the programme should preserve the therapeutic language in English. For example:

*“The terms cognitive, motor planning, bilateral integration, and sensory should be in English to avoid term confusion and misunderstanding during practice.” (ID12)*

In addition to that, the expert also suggested enhancing the definition of the terms. Experts agreed that the programme should provide a list of registered terms of definition related to handwriting intervention to guide novice professional practitioners.

*“Any information regarding the definition and terms must have citations and references, especially for the teachers or young therapist to familiarize themselves with handwriting terms and definitions.” (ID6)*

They also suggested that headings and sub-headings should be clearly stated on the top of each page to improve the readability of the programme content. The action was taken on these suggestions.

#### Content of the handwriting intervention programme

Section A was the introduction section. This section indicates the handwriting issues among children and theoretical occupational therapy solutions to address handwriting problems. The expert (ID9) expressed approval on this section:



*"I think this section has little to be redacted.....just the spelling for some words..the section has addressed the theoretical foundation around handwriting issues" (ID9)* Section B was about the procedure for conducting handwriting intervention. Section B includes an essential guide in screening, assessment, planning, intervention, and re-evaluation processes. Expert panelists agreed that this section needed to simplify the procedure through a clear flow chart on conducting a handwriting intervention programme from beginning to discharge.

*"..a flow chart might be helpful to explain the procedures and also..I suggest including a page reference note to assist the reader in finding the intended content while looking for specific information." (ID12)*

As this programme will be used in Malaysia, experts agreed that the selected sentence for the copying skills activity during screening should use a sentence in the Malay language.

*"..I have to say, we need to put a complete Malay language to replace the English version of the famous sentence for handwriting copying task.." (ID4)*

Earlier, the researchers applied an English sentence in the programme: 'The quick brown fox jumps over the lazy dog' (27). Therefore, a Malay version of the sentence which includes all letters from A to Z was added 'Zahra fikir nak bawa beg cantik ke kelas Iqra dan mop Norwex versi yang baharu.'

Section C was the handwriting readiness skill intervention. This section comprises handwriting development, pre-writing skills, and motor skills activities in preparation for handwriting. For this section, the expert (ID2) proposed an indication of readiness for skills intervention strategies according to developmental age.

*"..that would assist practitioners in applying grading methods in handwriting readiness intervention activities by choosing intervention activities appropriate to the child's developmental skills." (ID2)*

In addition, the expert (ID4) suggested that handwriting development should emphasize the five phases: scribbling, imitation, tracing, copying, and writing from memory (28). These handwriting development phases should include an age reference.

*"Even though this is a handwriting programme to teach handwriting skills, we cannot take away the handwriting developmental milestone like scribbling, imitation, tracing, copying, and writing from memory. We should include that too." (ID4)*

It was claimed that activities for gross motor skills should allow the therapist to perceive the child's level

of sensory modulation (29), visual perception (30), and attention span (31). Experts (ID5) suggested that the theoretical aspect and procedure of conducting gross motor intervention activities should be clearly defined (for upper and lower limbs). The researchers arranged the intervention procedure for each activity in a step-by-step explanation supported by expected figures.

*"For this programme, it must have a clear explanation of how to conduct gross motor and fine motor skills, especially the involvement of upper and lower limbs during the intervention session." (ID5)*

Six experts (ID2, ID4, ID5, ID7, ID8, and ID13) agreed that this section should include a variety of sensory-motor activities with multi-sensory materials to increase handwriting readiness skills (32–34).

*"..I agree if this programme add explicit information on the materials to be used along for intervention activities to support sensory-based approach in practice.." (ID4)*  
*"..add on sensory material such as using chalkboard, wet sponge and blocks for the letter recognition activities." (ID13)*

Section D was the handwriting skills intervention section. This section describes the pragmatic approach to using correct handwriting tools, promoting functional pencil grasp, facilitating ideal posture and position, and demonstrating the best method of writing capitals, lowercase, and numbers. For this, experts recommended detail explanations of a child's needs in handwriting intervention such as (1) the importance of proper sitting position (ID4), (2) the significance of using selected adaptive handwriting tools (ID9), and (3) the essence of intrinsic (motivation) and extrinsic (environmental condition) requirements during handwriting intervention (ID4). In addition, the experts (ID9) advised the need to specify the information about using handwriting tools in terms of its advantages and the criteria needed to allow the use of tools during handwriting activities.

*"..it is worth demonstrating the biomechanism of proper sitting during handwriting intervention as it might affect the quality of handwriting task...we can list down why the correct position is important in the programme.." (ID4)*

*"..moreover, we have to be careful about the use of adaptive handwriting tools, it cannot be simply used without knowing why we choose the tool for the selected child, I think we need to make clear the significance of using the adaptive tools during handwriting tasks." (ID9)*

*"..as this programme might be useful for teachers to use in the classroom, I think it might be useful if we explain what motivates the child to do handwriting tasks such as rewards, behavioural strategies.. as well as*

*setting up a conducive environment for children to fulfill handwriting task conveniently.” (ID4)*

Other than that, the expert (ID7) also recommended explaining how handwriting strategies can differ in left-handed writers to guide practitioners in their intervention programme. For example, left-handed writers can draw lines from right to left instead of the reverse (35).

*“..left-handers and right-handers might have different preferences in drawing strokes and lines for letter formation, it is useful to guide practitioners that left-handed writers can be allowed to draw lines from right to left.” (ID7)*

Furthermore, experts confirmed that letter formation activities must correspond with audio-visual (letter storytelling) techniques. The language used to describe pencil movements during letter formation activities must be compatible with the proposed strokes. Moreover, the expert suggested that safety precaution notes should be included at the bottom of the page of each intervention activity related to physical and motor movement.

*“If we put safety precaution notes on the gross motor activities page, it will guide the teachers or therapist to be more aware of the safety issues during intervention session.” (ID3)*

Expert ID4 recommended that each pencil grip diagram include definitions, steps to encourage correct pencil grasp, and benefits of each pencil grip.

*“Correct diagrams could visually assist the practitioners in enhancing an effective pencil grip during the intervention session.” (ID4)*

Section E was the handwriting intervention module activities. In this section, the researchers incorporated the entire programme into a series of handwriting activities to be carried out with the children. This section had six sub-sections: (1) Development of Handwriting Skills Activities, (2) Pre-writing Skills Activities, (3) Gross and Fine Motor Skills Activities, (4) Writing Capital Letters, (5) Writing Lowercase Letters, and (6) Writing Numbers. In this section, experts suggested the module should highlight the importance of start and sequence during alphabet writing concerning intervention in the letter formation aspect (35).

*“..on the handwriting module activities, we should emphasize the starting point of letter formation. If the starting point is correct, it is less likely for the letter to be written in reverse..the starting point will help the children...” (ID2)*

Furthermore, experts ID3, ID8, and ID11 agreed that the module should represent the main objective of the entire handwriting intervention programme.

*“This section should include a checklist of activities completed with the child because it was an exclusive practice session with the therapist.” (ID3)*

*“This section should contain information about executing handwriting intervention according to each sub-section.” (ID8)*

*“A sample of the letter formation guide for this section should be included in the appendix for reference.” (ID11)*

The identification of an effective content domain was established at this stage. The proposed domain such as handwriting readiness skills and handwriting skills intervention were recognized and re-arranged. Overall, the objective of the FGD was to reach a consensus among the experts about the developed handwriting intervention programme. All relevant suggestions were justified and considered.

## **Results from CVI analysis (Stage 2)**

### **Face validity**

Face validity of the revised handwriting intervention programme had shown 100% expert agreement for all items, specifically font size, graphic design, language used, and content (section arrangement). From the findings, excellent agreement for the physical appearance of the revised handwriting intervention programme has been established. All experts agreed to accept the visual impression of the revised handwriting intervention programme (36). However, face validity needed to be supported by the content validity score.

### **Content validity**

Content validity scores showed very convincing values, ranging from 0.99 to 1.00 of S-CVI values on four dimensions for each section in the revised handwriting intervention programme (Table III). The validity acceptance score of CVI is set out at 0.78 (for at least 9 experts) (37). For further details on the validity acceptance score, a few researchers set a level of validity that can be used for this study in which a value of 0.70 to 0.79 has average validity acceptance, 0.80 to 0.89 is adequate, 0.90 to 0.99 is an excellent and perfect score of 1.00 had excellent validity acceptance (38,39). Based on this information, the content validity index showed a very good to excellent power of acceptance (0.99 to 1.00).

## **DISCUSSION**

To support the pragmatic use of the developed handwriting intervention programme, the findings are discussed about the study design, sample, and research objectives. The outcomes of this study support the importance of conducting a content validity study using

**Table III: Content validity for I-CVI and S-CVI score for each section**

Section	I-CVI				S-CVI/UA
	Relevancy	Clarity	Simplicity	Ambiguity	
<b>Section A: Introduction to Handwriting Skills</b>	1.00	1.00	1.00	0.92	0.99
<b>Section B: Occupational Therapy Service Procedure for Handwriting Intervention</b>	1.00	1.00	1.00	1.00	1.00
<b>Section C: Intervention for Handwriting Readiness Skills</b>	1.00	1.00	1.00	1.00	1.00
<b>Section D: Intervention for Handwriting Skills</b>	1.00	1.00	1.00	1.00	1.00
<b>Section E: Handwriting Intervention Module</b>	1.00	1.00	1.00	1.00	1.00

I-CVI= item content validity index, S-CVI/UA=scale content validity index/ universal

a list of expert panelists. The content validity study was a valuable method for a quantitative measure to evaluate the developed handwriting programme. Content validity is very useful in developing and validating a product. The results yielded a critical analysis of the groundwork that underpinned the development of a handwriting intervention programme for children with handwriting difficulties.

The content of the developed handwriting intervention programme could be used by professional practitioners, including teachers and therapists, to guide their practice. The experts' feedback from the FGD session portrayed that this programme could help novice therapists in service delivery for children with handwriting difficulties. The experts expressed concerns regarding the physical appearance such as font and graphics-wise to increase readability, appearance, and relevance for professional practice. Therefore, experts' agreement that this programme should maintain real photos for biomechanical intervention activities was highly acceptable for the accuracy of treatment handling. The physical appearance of the developed programme was consistent with the current idea to produce a handwriting programme with commercial value for long-term professional practice (13).

Experts also pointed out the language used to prevent misunderstanding even though this programme was developed in the Malay language. The use of language was very important because the developed programme was constructed in the Malay language for use among Malaysian professional practitioners which might interfere with the word meaning in terms of definition and explanation. Therefore, the suggestion to preserve the use of the word in English was relevant. The language aspect might be the unique contribution to this study because there was minimal evidence-based and established handwriting intervention programme in the Malay language to fit the national curriculum (12).

Furthermore, the central discussion focused on the programme content because it consisted of extensive information on the theoretical foundations of handwriting

skills, service delivery procedures, handwriting readiness activities, handwriting intervention, and activity modules to support treatment for children. Considering the recommendations and suggestions by experts, the content had been revised to have explicit information on occupational therapy intervention approaches for handwriting such as sensory-motor, visual perception, multi-sensory, developmental, and compensatory techniques (33,40). Hence, the recommendations were relevant to the prominent studies on occupational therapy handwriting intervention fundamental frameworks.

Following the sequential exploratory design in this study, the first stage findings from the focus group discussion have been discussed thematically among authors. Variations of each comment were thoroughly analyzed to justify the applicability of the handwriting intervention programme. Subsequently, revisions of the programme were enacted and returned to all experts in the second stage for review and scoring. This was to guarantee that the study's main objective was achieved, where all experts agreed with the revised version of the programme (41). The researchers integrated both findings from FGD and CVI scores to conclude the development and validation procedure of an intervention programme. Although, the application of both qualitative and quantitative methods in this single study was insufficient to claim that this is mixed methodology research (15).

The experts' characteristics in this study varied in the type of professions such as clinicians, management officers (policymakers), and educators. This means expert opinions came from the viewpoint of practicing occupational therapists in handwriting intervention, supported by managerial officers who have been involved in the development of standard operating procedures and specific intervention modules. There was also input from the academician experts who have been doing research in the school-based occupational therapy area. Thus, the variation of experts' characteristics was valuable and beneficial for this study.

This study required extensive conceptual and developmental effort to formulate the content on the

methodological aspects. The study was fully supported by an outstanding profile of expert panelists regarding content construction validity (36). Nevertheless, explicit instructions needed to be given to the experts about the programme design and rating procedure to ensure the quality of this research findings.

Based on the content validity index score, the handwriting intervention programme achieved an excellent acceptance level among experts. The content of the intervention programme satisfactorily incorporated fundamental elements of occupational therapy practice for children with handwriting issues. It was a good indicator that the content in the handwriting intervention programme was sufficient to meet the specific handwriting intervention foundational domain (41). Therefore, this developed handwriting programme is relevant for a feasibility study in the next research.

This study employed a two-stage procedure to develop and validate a handwriting intervention programme that offered eventual value in the procedural step. However, the effectiveness of the handwriting intervention programme in practice is still unproven. Hence, it is highly recommended that the effectiveness of this handwriting intervention programme be tested on children in future research. Furthermore, while the CVI scores in this study showed content validation of the developed handwriting programme, reliability must be determined in the subsequent research.

Despite having a convincing score on the content validity, this study involved a small sample of occupational therapists and clinical psychologists (n=13), limiting this study's generalizability. The recruitment process of experts was based on purposive and convenient sampling, thus increasing the biasedness in this study. It would be beneficial to conduct a further study with more diverse content experts working in school-based occupational therapy and special education setting in Malaysia, including preschool and special education teachers. Regarding the content of the developed handwriting intervention programme, this study gained acceptable content validity value from experts. However, the consensus experts could not guarantee the accuracy of the developed content in this programme (41). Another limitation was the purpose of focus group discussion; experts may have been influenced by others during the sessions, preventing them from expressing their independent opinions.

The key finding from this study was that the developed handwriting intervention programme provides a professional protocol for therapists and teachers to treat children with handwriting difficulties. Moreover, the Content Validity Index score was relevant for investigating the quantitative validity of a developed intervention programme. Meanwhile, focus group discussion was applicable to explore qualitative opinions and reach

a consensus among experts to improve the content of a developed handwriting intervention programme for rehabilitation purposes.

Therefore, this study documented preliminary evidence for content validation of the developed handwriting programme as a tool to guide professional practice to support children with handwriting difficulties to engage in the school curriculum. Hence, it also established a unique arrangement of handwriting intervention activities and strategies from existing frameworks to assist children with handwriting issues that fit into the Malaysian school curriculum. This handwriting intervention programme might humbly solve specific handwriting issues commonly seen among children. However, it was hoped that this newly developed handwriting intervention programme could be replicated for future research in education and professional implementation for sustainable evidence-based practice.

## CONCLUSION

In conclusion, a content validity procedure was crucial in developing a handwriting programme for a targeted population in a specific sociocultural background like Malaysia. The developed handwriting intervention programme satisfied the minimum requirements of an expert validity score to ensure its acceptance for use in the next phase of the research study, investigating the feasibility and effectiveness of children with handwriting difficulties. It was a significant advantage to modify the content according to the expert opinions to obtain a high validity level for the constructed programme before a further study is executed. Based on this study, the developed programme showed initial content validity and a potential tool that can be used among professional practitioners for future handwriting intervention among children with handwriting difficulties.

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